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UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**
SEPTEMBER 1948

EROSION CONTROL PRACTICES DIVISION

Effect of Different Soil-Improving and Winter Cover Crops on Sweet Corn Yields - O. R. Neal, New Brunswick, New Jersey. - "In the sweet corn area of Burlington County the corn is normally harvested early, leaving a comparatively long growing period in the summer and fall. The Extension Agent has urged the planting of different organic matter producing crops and winter cover crops during this period. In the past season we cooperated with the Extension Service in measuring sweet corn yields following different crop treatments. The yields are shown in the following table.

Sweet corn yields following different winter cover and organic matter producing crops

Farm	Treatment	No. Ears/A.
A	Sunflowers	17,400
	Crimson Clover	14,900
B	Ryegrass	8,710
	Vetch	11,290
C	Sunflowers & Vetch	9,480
	Vetch	11,920
	Sorghum	10,240

"The soil management program on the farms was sufficiently good so that yields from areas left bare over the fall and winter were not available. Any one of the above listed treatments would be expected to increase yields considerably over that from areas where no soil improving crop was grown.

"Differences between these treatments varied from farm to farm. There appears to be a tendency for increased corn yields following winter vetch. This effect has been noted repeatedly in results from the Marlboro plots."

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** All research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

Brush Control - Chemicals - Beaters - Public Interest - Harley A. Daniel, Guthrie, Oklahoma.-Mr. Elwell has checked his results on the use of chemicals for brush control and finds that good results were obtained with 2,4,5-T on persimmon, oak, hickory and mesquite. The persimmon and mesquite plants were nearly all dead above the ground, however, there was some resprouting from the roots. Oak and hickory appear to be completely dead. Where 2,4-D was used, either with Tat-C-Lect or ammonium trichloroacetate, the results on the above species compared favorably with that obtained from 2,4,5-T. But resprouting was also observed on mesquite and persimmon. Several airplane applications of 2,4-D on brush was observed. The most successful applications were made by Chester Himel, chemist for the Phillips Petroleum Company. The species he treated were largely oak and hickory. He made his own formulation, using about 5 gallons of acid per acre plus 10 gallons of spray solution.

"Mr. Cox made a study of the capacities and efficiency of various brush beaters on black-jack oak, post oak, shinnery oak, sumac, sage and skunk brush. These studies were conducted at various locations near Guthrie and Cheyenne, Oklahoma. From his observation it appears that the brush beaters are more useful on the brittle and smaller type shrubs.

"There appears to be a tremendous interest throughout the country in brush control work. The following table shows that we have received 313 letters from 37 states and 5 countries from July 1, 1947, to September 30, 1948.

Number of Letters Concerning Brush Control Received from Various States and Countries - From July 1, 1947, to September 30, 1948, at the Red Plains Conservation Experiment Station, Guthrie, Oklahoma.

State	No.	State	No.	Country	No.
Arizona	1	Maryland	1	Guatemala	1
Alabama	1	Maine	1	British Columbia	1
Arkansas	7	Montana	1	Chu, T. H.	1
Colorado	1	Massachusetts	1	Cuba	1
California	2	Nebraska	1	Canada	2
Delaware	2	New York	3		
Florida	3	N. Carolina	1		
Georgia	4	Ohio	20		
Indiana	2	Oklahoma	133	Totals:	
Illinois	9	Oregon	1		
Idaho	2	Pennsylvania	9	Letters:	313
Kansas	11	S. Carolina	1	States:	37
Kentucky	3	S. Dakota	1	Countries:	5
Louisiana	6	Texas	29		
Michigan	5	Tennessee	4		
Minnesota	5	Utah	2		
Mississippi	4	Virginia	3		
Missouri	25	W. Virginia	1		
		Washington	1		

Soil Moisture Conservation in Relation to Chemical Control of Weeds -

Torlief S. Aasheim, Havre, Montana.-"Soil moisture samples were taken during the month from several of the plots in the chemical fallow project at Havre. The plots which were sprayed during the summer for weed control without any cultivation had very little more moisture than plots which were neither cultivated nor sprayed. Failure to satisfactorily control Russian thistle accounts for the poor moisture storage in the sprayed plots. Stubble plots sampled on which oats were grown this year had more moisture in the soil than either the idle or the sprayed fallow plots. The table below briefly summarizes some of the soil moisture samples taken.

Average percent of moisture per foot of soil to a depth of 4 feet. Samples taken at three locations on each plot on September 28, 1948, North Montana Branch Station, Havre, Montana.

<u>Plot Treatment</u>	<u>Average percent moisture per foot of soil</u>
Idle	3.7
Sprayed fallow (2-4-D)	4.6
Oat stubble	6.3
Cultivated fallow	9.2

"Data in the above table indicate that perhaps some tillage must be used in connection with chemicals in order to get satisfactory moisture conservation on fallow.

"On the chemical fallow plots in the Froid field trial Russian thistles did not become a problem but one cultivation was necessary to control wild oats, volunteer wheat and green foxtail. This one cultivation was done in July."

Wheat Yields as Effected by Fallow and Residue Management Practices -

C. L. Englehorn, Fargo, North Dakota.-"The wheat crop produced on the tillage plots was harvested during the middle of August. Rainfall during the seasons was low and relatively low yields were obtained. Under continuous wheat the yields in bushels an acre obtained, according to the types of tillage employed in seedbed preparation, were as follows: Removal of residue by burning, no tillage, 7.2; disking, 7.5; plowing seeded by pony-press drill, 7.4; 2-ton of straw, stubble mulch tillage, 8.4; plowing, 8.6; stubble mulch, 9.3; and tillage with the field cultivator, 9.6.

"The yields from summer fallow were essentially double those from continuous wheat. Fallow tilled by means of the field cultivator produced 15.3 bushels; stubble mulch tillage with 2 tons of added straw, 16.8; stubble mulch fallow without added straw, 18.5; plowed fallow, pitted in the fall, 19.2; and ordinary plowed fallow, 19.7."

Wheat Yields Increased by Rotations - C. J. Whitfield, Amarillo, Texas, - "The average wheat yield in the wheat, sorghum, and fallow system during the past 7-year period, 1942-48, has been 20.6 bushels in comparison to only 13.7 bushels per acre on continuous wheat, a difference of 6.9 bushels per acre in favor of the wheat in the 3-year system. This, on a percentage basis, represents a 50 percent increase in yield. During favorable wheat years, the percentage increase goes down, though during unfavorable years, as in 1948, the percentage goes up. For example, in 1948 the wheat yield on fallow was 19.6 bushels per acre in comparison to only 2.4 bushels per acre on continuous wheat.

Stubble mulch studies - "Yields of wheat from the stubble mulch experimental plots again demonstrated the practical benefits of sub tillage and surface preservation of residues on the near-failure crop of 1948. As shown below, in the table of yields, continuous wheat with 'sweep' tillage was 1.6 bushel or 35% over that with the oneway.

Cropping	Implement	Yield *	
		Bu/Acre	Increase
Continuous wheat	Oneway	4.6	-
	Sweeps	6.2	1.6
Wheat after fallow	Oneway	13.9	-
	Sweeps	15.7	1.8

* Figures given are averages of four plots for each treatment.

"All plots were seeded to Westar wheat, 30 pounds per acre, on November 11, 1947 and due to unfavorable weather and moisture conditions, very little growth was made until the spring of 1948. Except on fallowed ground, the subsoil was at the wilting point until melting of the winter snows. Wheat stubble was very effective in catching and retaining snow while oneway land was kept nearly bare by the wind.

"Due to an extreme drought from the time of the previous harvest until winter, practically no volunteer wheat had started in time to be killed. As the crop progressed in the spring, the subtilled wheat was taller and less weedy than that of the oneway. Toward the end of the growing season, the general lack of soil moisture tended to equalize appearance of the crop under various treatments but it seemed evident that had rain occurred late in the season, the stubble areas were in better condition to take advantage of it.

"Yields after fallow, curiously, show nearly the same increase for sub-tillage as occurred with continuous wheat. This was practically without benefit of residues in the case of both types of tillage as a light straw was produced in 1946 and fallow in 1947 had soon destroyed it. This, and other evidence indicate that there is some favorable factor, probably physical, which results from the use of sub tillage but which, as yet, we have been unable to identify.

"Erosion during the past season has been slight as climatic conditions were moderate. Stubble land was completely free of soil loss and little soil movement occurred on bare areas. The heavy straw of 1947, as preserved by sub tillage, would have been of great value had high winds or heavy rain occurred. Fortunately, it was not greatly needed this season, but with a light cover of the new straw and very little of the old straw now remaining, extent of soil blowing may very well be of a different character in the coming winter."

Crop Yields in Relation to Land Classes - J. R. Johnston, Temple, Texas.-"Crop yields from the short term crop rotation experiment started in 1947 have been obtained and summarized for the 1948 crop year. The effect of treatment on yield this year cannot be detected since the study has been under way for only a short time. However, summary of crop yields by classes of land are interesting. Study of the data in the following table show that oat yields are highest on Class I land and lowest on Class III land. Cotton, corn, and grain sorghum yields were highest on Class II land and lowest on Class III land. These data, if substantiated by future years data, will have considerable bearing in planning cropping systems on the various classes of land.

1948 Crop Yields* from 3 Classes of Texas Blackland

Crop**	Acre yields of class of land		
	Class I	Class II	Class III
Cotton	159	240	90
Corn	35.6	36.6	19.9
Oats	44.0	34.0	27.3
Gr. sorghum	28.8	29.4	25.3

* Cotton yield data are averages from 17 plots, Corn data from 14 plots, gr. sorghum data from 9 plots, and the oat data from 13 plots.

**Cotton yield - lbs. lint/A. Grain yield per acre for corn, oats, and grain sorghum.

Farm Business Comparison for 1947 on High-and Low-Conservation Farms - E. L. Sauer, Urbana, Illinois.-"The high- and low-conservation farms are compared for the year 1947 in the following table. Acreage per farm and acreage in improved land were practically the same for the two groups. The soil productivity rating was 4.5 on the high farms and 4.2 on the low farms.

"Inventory values of land were the same for the two groups, but total farm investment was \$25 higher per acre in the high group. Building and fencing costs were \$1.63 higher per acre on these farms. Soil improvement costs in the two groups were the same. The high-conservation farms have completed most of their limestone and phosphate requirements. Hence present soil improvement expenditures represent primarily maintenance needs for limestone and phosphate, plus fertilizers for current crops.

"The high-conservation farms had 42 percent of their tillable land in hay and pasture and 58 percent in grain crops compared with 35 percent and 65 percent, respectively, for the low-conservation farms. The most important difference in land use was that the high group had 38 percent of their tillable land in biennial and perennial legumes compared with only 28 percent for the low group. Yields were four bushels an acre higher for corn and eight bushels for oats on the high-conservation farms.

"The high group fed \$9.07 more feed per acre to livestock, and the returns were \$6.00 more per \$100 worth of feed fed. The high-conservation farms milked 1.8 more cows, produced 1,750 more pounds of milk per cow, and also produced 43 more pounds of meat per acre.

"Labor and power and machinery costs averaged \$6.00 and \$4.50 more per crop acre, respectively, on the high-conservation farms, probably because of the larger number of livestock on these farms.

Comparison Between High- and Low-Conservation Farms, Stephenson, Jo Daviess and Winnebago Counties, Illinois, 1947

Item	35 high- conservation farms ^{a/}	35 low- conservation farms ^{b/}
Acres per farm	230	231
Acres of improved land	163	161
Soil productivity rating ^{c/}	4.5	4.2
<u>Capital items (per acre):</u>		
Inventory value of land	\$ 63	\$ 63
Total farm investment	180	155
Annual cost (cash and depreciation)		
Buildings and fences	5.36	3.73
Soil improvements	1.48	1.46
<u>Land Use:</u>		
Percent of farm tillable	67	65
Percent of tillable land in:		
Corn	33	35
Soybeans	1	1
Oats	23	24
Other crops	1	5
Hay and pasture	42	35
Biennial and perennial legumes	38	28
<u>Crop yields, bu. per acre:</u>		
Corn	52	48
Oats	53	45

(Continued on next page).

Livestock:

Feed fed per acre (includes value of pasture)	\$54.20	\$45.13
Returns per \$100 feed fed	149	143
Percent cash farm sales from livestock	94	92
Pounds meat produced per acre	211	168
Average number of milk cows	19.8	18.0
Pounds of milk per milk cow	8500	6750

Expenses per crop acre:

Labor	\$ 30.31	\$ 24.30
Power and machinery	24.19	19.69

Earnings:

Net income per acre	44.16	36.40
Rate earned on investment (percent)	24.5	23.5

- a/ Twenty farms were owner-operated, 3 part-owner-operated and 12 tenant-operated.
- b/ 17 farms were owner-operated, 4 part-owner-operated and 14 tenant-operated.
- c/ Soils rated according to the system used by the Illinois State Soil Survey, the most productive types rating 1.0 and the least productive rating 10.0.

Cover Crops in Orchards - John T. Bregger, Clemson, S. C. - "Observations were made on various cover crop species and management practices. It appears that nothing less than a total utilization of cover crop residues as ground cover will provide the amount of protection needed to prevent the harmful effects of direct rainfall. In other words the nearer we approach a perfect mulch, the more effective are cover crop residues in preventing surface compaction and in decreasing runoff.

"Several treatments will illustrate the point. In the case of perennials, the Lespedeza sericea plots are becoming outstanding in their ability to absorb all rainfall even when it falls at a high intensity. Among the reseeding winter annuals, crimson clover provides the best and longer lasting mulch. It even shades out weed growth which tends to be quite prevalent in the So. spotted bur clover plots. Among the winter annuals, rye provides the most ground cover. We are now utilizing all of these residues as mulch by rolling down with a heavy weed cutter. Vetch and other succulent legumes provide almost no lasting ground cover in contrast to rye which gave the most.

"Summer annuals utilized as winter mulch were partially effective into the following summer if not buried too much in tillage operations. Sudan grass showed up as the best non-legume; Crotalaria incana and C. lanceolata as the best legumes. C. spectabilis is proving successful but does not leave a 'woody' type of residue."

Annual and Average Grain Yields of Winter Wheat Produced by Various Cultural Treatments on One Year Fallow on Basin Project at Agricultural Experiment Station, Garden City, Kansas.

Cultural Treatment	Bushels grain per acre									No. Yrs. Ave. 8 5
	1941	1942	1943	1944	1945	1946	1947	1948		
44" Basin list on contour	30.6	18.9	18.4	28.5	24.5	12.2	41.4	23.5	24.8	26.0
44" Ordinary list on contour	31.8	17.9	17.4	26.7	24.6	16.1	39.5	23.7	24.7	26.1
44" Basin list up and down slope	30.0	19.3	(10.5) (b)	21.8	19.1	19.2	37.2	21.9	22.4	23.8
44" Ordinary list up and down slope	27.4	14.2	(10.2) (b)	25.7	16.6	15.6	37.9	22.9	21.3	23.7
30" Basin on Contour	31.8	15.2	19.2	20.5	32.2	17.9	47.0	16.9	25.1	26.9
30" Basin up and down slope	27.2	15.8	17.1	19.2	25.8	17.0	36.7	16.8	22.0	23.1
One-way on Contour	30.9	15.2	17.6	25.0	30.2	16.3	43.4	17.5	24.5	26.5
One-way basined on contour	25.3	17.3	16.5	26.0	24.1	19.4	42.1	18.6	23.7	26.0
Good farm practice (Basined on contour)	29.8	14.3	16.2	26.1	25.0	16.7	44.8	15.7	23.6	25.7
Trash fallow on contour (Straight blade or large sweeps)	(21.8) (a)	(11.1) (a)	(6.2) (b)	24.0	28.9	14.5	44.4	17.6	21.1	25.9

(a) Not comparable to other methods these years, as short fallow period in getting method started.

(b) Badly infested with Russian Thistle.

Effect of Different slope Lengths on Soil and Water Losses - B. H. Hendrickson, Watkinsville, Georgia.-"Shortening the slope length of runoff plots from 70 feet to 35 feet on a 7 percent slope, has reduced runoff and per acre soil losses in many instances. This trend has been most noticeable with the continuous row cropping practice. But little is known about crop rotations in this connection.

"Four years' soil and water loss data obtained from certain of the Station's rotation plots were examined, from this standpoint. The 2-year rotation consisted of vetch turned under as green manure in the spring followed by corn and crotalaria, the residues of which were turned under for cotton grown the following year. This is considered a rather weak row-crop rotation from the soil-protective standpoint on Class III land of 7 percent slope. By comparison with continuous cotton, it is only about 50 percent effective.

"The overall 4-year average soil and water loss figures for this rotation on plots 35 and 70 feet long did not reveal any appreciable differences.

"Some savings were indicated in favor of the shorter plots when the data for only the more erosive 6-month main growing seasons were compared. When the soil and water loss data for 9 excessive rainstorms were tabulated, larger savings were shown in favor of the shorter slope length in most cases.

"Judging from a detailed study of the plot losses, what happened during mildly erosive storms was that the lower segment of a 70-foot long plot infiltrated some of the runoff coming as sheet flow from its upslope portion. It also accumulated some sediment from the overwash, which resulted in less per acre soil and water loss from the longer plot as a whole.

"During severe storms, the reverse generally happened. Instead of added infiltration, pore-clogging due to soil in suspension carried in overwash resulted in higher runoff from the longer plot. The scouring action of concentrated flow from upslope induced additional erosion on the lower segment. In these cases, the per acre soil and water losses from the longer plot exceeded those from the shorter plot.

"There were some increases in soil absorptability and resistance to erosion developed by consistent use of this rotation on the runoff plots, which tended to equalize the soil and water losses on the 2 slope lengths, in terms of average annual data. However, it is the occasional excessive rainstorm of highly erosive character that well-designed conservation methods need to combat, to be effective.

"Short slope lengths of row crop strips can - in effect - be obtained in terrace field lay-outs when the row crop strip straddles the terrace. Alternating strips in close-growing crop coverage in rotation are needed in this case to provide effective protection to a high degree."

Grazing Studies - D. D. Smith, Columbia, Missouri. - "Mr. Whitt has summarized the results of the grazing studies for 1948 as follows:

"Favorable rainfall and improved soil treatments have combined to produce exceptional beef gains on the pasture this year. The grazing season ended on September 27 for all plots except fall small grain and winter utilization of old growth on permanent pasture areas. The season's production is indicated.

	<u>Dates</u>	<u>Gain lbs./acre</u>	<u>Animal Days per acre</u>	<u>Gain per Animal Day</u>
Bluegrass check	4/9-9/10	258	109	2.4
Bluegrass contour furrows	"	190	109	1.7
Bluegrass renovated	"	333	133	2.5
Tim., Sw. Cl., Lesp.	"	365	130	2.8
Timothy & lespedeza	"	395	135	2.9
Bromegrass & sweet clover	"	242	96	2.5
*Alta fescue & Birdsfoot trefoil	4/30-9/10	122	76	1.6
Rye & soybeans	4/5-5/13 (Rye)	350	81	4.3
Oats (hay) & lespedeza	7/21-9/27 (Lesp.)	111	70	1.6
Wheat & lespedeza	4/9-6/18 (wheat)	195	62	3.1
"	6/18-9/27 (lesp.)	212	88	2.4

* Not grazed 5/24 to 7/16. Fescue seed crop 72 lbs./acre.

"Reclamation area 1 and 2 in a 2-year rotation of rye-sweet clover, lespedeza and redtop continued to produce well in 1948, though second-year sweet clover and lespedeza were poor on severely eroded area 2. Production was as follows:

	<u>Dates</u>	<u>Gain lbs./acre</u>	<u>Animal Days per acre</u>	<u>Gain per Animal Day</u>
Recl. 1 - Rye *	4/5-5/4	433	98	4.4
Recl. 1 - Sweet clover	7/26-9/10	119	47	2.5
Recl. 2 - 2 yr. sweet clover & lespedeza	4/22-9/1	139	96	1.4

* Also produced 10.4 bushels per acre rye.

"Note that Reclamation Area No. 1 produced a total of 552 pounds of beef plus 10.4 bushels of rye grain per acre. Sweet clover was 12 to 18 inches tall when cattle were removed September 10 to permit nutrient storage for next year."

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"The 3.33-inch rainfall for the month caused significant runoff on only the straight-row watershed - 0.46 inch. Mr. Dreibelbis reports that prior to the rain of September 6, moisture in the top 7 inches of soil had reached a minimum for the year. Moisture in the 7- to 14-inch depth continued to diminish until the storm of September 19. Although soil moisture increased during the 1.03 inch rainfall, September 6-8, and 1.36 inches September 19-21, there still remained almost 5 inches of empty pores in the 0- to 14-inch depth of soil. The table on page 12 illustrates by small depth increments how the soil moisture fluctuated in the period September 3-22.

"In the period September 9-17, there was no rain. The loss in soil moisture of less than 0.04 inch per day reflects the low quantity of water used by vegetation at this season."

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"In September we received 1.09 inches of precipitation, 0.79 of which fell on September 7. With a dry August and a continued dry September the soil-moisture condition does not favor winter wheat, which was seeded the latter part of September. The wheat is coming up spotted and needs a good rain to germinate the seed and give the crop a good start before winter sets in."

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.-"The 1948 yield data for wheat plots were compiled and analyzed by Mr. E. R. Baugh.

Table 1.--1948 Wheat yields, crop residue and mulch tillage experiment, Furdue-Throckmorton Farm, Lafayette, Ind.

Tillage treatment for corn in 1946		Bu./A. at 13.5% moisture	
		Fertilization ^{1/}	
Meadow residue	Depth of tillage	High	Low
Surface mulch	None prior to seeding	35.9	33.1
" "	2-3"	30.0	34.2
" "	7"	31.2	26.3
Mixed, 0-3"	2-3"	33.3	27.5
" "	7"	33.3	29.3
" 0-7"	7"	34.5	32.2
Under, 7"	7"	32.2	28.9
" 4-5"	4-5"	32.0	27.8

LSD: Tillage = 3.7; Fert. = 1.8, Tillage x Fert. = 4.5

^{1/}The high fertilization included 500 lbs. of 8-8-8 plowed under for corn and 500 lbs. of 0-12-12 seeded with wheat. The low fertilization included none plowed under for the corn and 150 lbs. of 0-12-12 seeded with the wheat. Corn in both treatments received about 150 lbs. of 0-14-7 with seeding. No fertilizer was applied for beans in 1947.

Table 1.--Data on soil moisture and available storage of various soil layers on corn and meadow watersheds for Sept. 1948

		Watershed		Watershed		Watershed	
		1/109		2/ 123		3/ 188	
Date	Soil depth	Soil moisture	Avail. storage	Soil moisture	Avail. storage	Soil moisture	Avail. storage
		in/in*	in/in*	in/in*	in/in*	in/in*	in/in*
9-3	0-1	0.056	0.454	0.049	0.467	0.062	0.448
	1-3	.059	.451	.048	.462	.067	.443
	3-5	.063	.447	.050	.460	.069	.441
	5-7	.065	.445	.055	.455	.074	.436
	7-10	.107	.373	.086	.414	.129	.351
	10-14	.125	.355	.088	.412	.152	.358
Inches of water	Total 0-14	1.25	5.68	0.97	6.10	1.48	5.45
9-8 (After rain-fall of 1.03")	0-1	.172	.338	.226	.284	.110	.400
	1-3	.112	.398	.155	.355	.076	.434
	3-5	.075	.435	.082	.428	.065	.445
	5-7	.063	.447	.056	.454	.068	.442
	7-10	.081	.399	.086	.414	.114	.366
	10-14	.086	.394	.088	.412	.152	.328
Inches of water	Total 0-14	1.26	5.67	1.42	5.65	1.48	5.45
9-17 (No rainfall Sept. 9-18)	0-1	.082	.428	.100	.410	.076	.434
	1-3	.074	.436	.074	.436	.070	.440
	3-5	.070	.440	.068	.442	.066	.444
	5-7	.066	.444	.054	.456	.068	.442
	7-10	.087	.393	.079	.421	.096	.384
	10-14	.076	.404	.078	.422	.140	.340
Inches of water	Total 0-14	1.07	5.86	1.04	6.03	1.33	5.60
9-22 (After rain-fall of 1.36" Sept. 19-21)	0-1	.208	.302	.253	.257	.233	.277
	1-3	.153	.357	.180	.330	.166	.344
	3-5	.133	.377	.167	.343	.122	.388
	5-7	.112	.398	.187	.323	.110	.400
	7-10	.163	.317	.227	.273	.153	.327
	10-14	.148	.332	.126	.374	.135	.345
Inches of water	Total 0-14	2.08	4.85	2.51	4.56	2.03	4.90

1/ Muskingum silt loam - meadow

2/ Keene silt loam - meadow

3/ Muskingum silt loam - corn with mulch culture.

*. Inches water per inch of soil.

"The beans in 1947 and the wheat were under a uniform tillage treatment. There was no significant residual affect of the tillage treatment for corn in 1946 reflected in the 1948 wheat yields. It appears in general that the highest wheat yields occurred where the corn yields had been the lowest."

Hydrologic Studies - G. A. Crabb, Jr., East Lansing, Michigan.-

"As measured by the U. S. Weather Bureau type of non-recording rain gages, precipitation for the month of September amounted to 1.63 inches at the cultivated watershed, 2.14 inches at the wooded watershed, and 1.74 inches at the stubble mulch plots. This is approximately 56 percent, 74 percent, and 60 percent of the 2.91-inch normal for East Lansing as computed by the U. S. Weather Bureau."

Hydrologic Studies - R. W. Baird, Waco, Texas.-"Following the dry month of July there was only 0.64 inch of rain at Station No. 69 during the month of August. All of this rain fell as small showers during the period August 25-30, inclusive. On September 8 and 9, a total of 1.79 inches of rain fell. This is the only rain of any value during the 2-month period. At the end of September all fields were very dry and the growth of grass in pastures had again stopped. Additional rainfall will be required to germinate fall-planted legume and small-grain cover crops.

"During September, Mr. W. D. Potter assisted in the planning of a technical publication using Waco data. It is believed that sufficient information is now available to evaluate the effect of size of area upon peak rates of runoff. Work is now under way tabulating and assembling the necessary data in form so that it can be used for this study. Also using the method previously applied to a study of the effects of conservation practices on rates of runoff, the additional information obtained during the last 3 years will be applied on this subject. It is hoped that during the present fiscal year much of this analysis can be completed."

Hydrologic Studies - T. W. Edminster, Blacksburg, Virginia.-

"On September 17 the Project Supervisor checked the Bell Creek installations and held a conference with Mr. Warner, Flood Control Engineer, concerning the possible application of full conservation practices on a watershed similar and adjacent to the Bell Creek watershed. It had been proposed that such practices should be applied to Bell Creek in the future. This, of course, would have nullified the future records on Bell Creek from the standpoint of giving runoff data from the existing land use and cover systems. Through the use of an adjacent watershed, which might possibly be gaged, additional data could be obtained."

"At the conference in the Washington Office on September 29 it was agreed to take steps to close out the Chatham watersheds at the close of this year. However, it is hoped that plans may be worked out whereby peak rates of runoff from excessive storms may still be obtained from a minimum of time and labor on the part of the observers. As soon as these plans have been more fully developed, the close-out amendment on this project will be prepared."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.-

"During the week of September 13, Mr. Blaisdell and Mr. Donnelly accompanied Mr. Culp and Mr. Moratz of the Regional Engineering Division on an inspection of conservation structures built in western Illinois. Most of these structures were over 10 years old. Fifty-three drop spillways, chute spillways, box-inlet drop spillways, and drop-inlet spillways were observed. Most of these structures were performing satisfactorily but some had failed. It appears that controlled grazing of earth dams is beneficial in keeping rodents under control. Also some means should be found to insure that the structures are properly maintained since maintenance is important if the structure is to have its maximum useful life. In two instances the water line through the dam had apparently been so high that large sections of the downstream face of the dam had sloughed off. Apparently only a few dams were built before the design was changed to prevent saturation of the downstream face. No signs of distress were observed when the dam had been properly designed. One vitrified clay tile pipe drop inlet spillway had failed because a cradle had not been provided for the barrel and the barrel had cracked as the weight of the fill was imposed upon it."

"Mr. A. F. Moratz, Civil Engineer in the Regional Engineering Division, spent September 27 to 29 inclusive, at the laboratory discussing the design research work desired for the Whiting Field Naval Air Station at Milton, Fla. The major problem is in designing the ditch junctions. The fact that the velocities are supercritical makes the problem very difficult. During Mr. Moratz's visit a Morris-Johnson type of outlet was tested for use in B-ditch. As originally designed, excessive scour occurred downstream from the structure. Fairly satisfactory operation could be obtained only by lowering the apron sufficiently to increase the effective tailwater over the end sill by forty percent. Tests of another design have been requested."

Hydraulic Studies - W. O. Ree, Stillwater, Oklahoma.-"During this period most effort was spent on maintenance and new construction. It was necessary to discontinue testing until provision could be made for safely disposing of the waste water. Good progress has been made. The following jobs have been completed:

- (1) A reinforced concrete flume with a SAF stilling basin discharging into Stillwater Creek has been completed.
- (2) The approach channel to the flume has been constructed. However, this channel is not yet in condition to receive water.

- (3) The west diversion dyke to intercept the water from the block A channels is finished.
- (4) The reinforced concrete gate to supply water to blocks D and F is finished.
- (5) The gate to the future block G, but presently supplying water to FC7 is finished.
- (6) The wooden sidewalls for the unit channels have been completely rebuilt.
- (7) Channel FC1, little bluestem, has been repaired. The center was planted to clumps of little bluestem to increase the uniformity of cover.
- (8) Channel FC2, weeping lovegrass, has been repaired. Lovegrass clumps were transplanted in the center to improve uniformity of cover.
- (9) Bermuda grass channel FC3 was disced and fertilized. This operation did not improve the cover as much as hoped. The stand of Bermuda is still thin and considerable triple awn is present. Evidently the discing was not thorough enough.
- (10) Yellow bluestem channel FC8 was weeded. A good stand of grass now covers the channel except for a narrow strip down the center where some rill erosion has occurred. This strip will be top soiled and the channel brought to cross-section. It is expected that the seed now maturing on the grass in the channel will reseed the center portion.

"Some tests were run during this period. Channel FC7 was subjected to several test flows. This channel is on a very light slope, 0.0002 ft. per ft. The data from the various experiments on it will be used to check the n-VR design method when applied to low velocities and larger depths. Testing could not be completed because of the inability of the pump supplying water to deliver more than 18 c.f.s. About twice this rate of flow is needed. By means of a temporary arrangement water will be brought from the block B forebay. This will provide sufficient water. However, before the channel is tested again it will be regraded. Originally the channel was excavated and shaped by means of a Caterpillar No. 2 terracer. Due to difficulty in holding this terracer on the bank slopes the cross-section and grade as excavated were not uniform enough for experimental purposes. The new grader will shape the channel within close tolerances. It is felt worth while to regrade the channel before testing is resumed."

Farm Ponds - T. W. Edminster, Blacksburg, Virginia.-"At the request of Operations, Mr. Holtan was called in for consultation on a problem pond at Salem, Va. Samples of the pond bottom material were tested in the laboratory and showed an analysis of approximately 70

percent sand, 15 percent silt, and 15 percent clay. This placed it exactly within the limits of good material for clay bonding. The samples were compacted at 150#/sq. in. in the laboratory and proved to be watertight under a 30-foot head of water and have remained watertight to date. According to laboratory results, this is the best site that has yet been found in the test area for soil compaction. A good deal of skepticism was evidenced by all parties either visiting the site or observing a loose sample of this soil. Indeed it looks like a very poor soil for a pond bottom; however, the laboratory and the literature indicate that it is optimum.

"In furtherance of this study of the effect of textures on sealing, Mr. Holtan is now working with various materials in studying their effect upon volume in various grades and admixtures. It has been found that equal parts of grades mixed together give less voids than either excesses of large particle size or excesses of small particle size. The data indicate that the range in particle size is a significant factor in reducing the voids of the admixture. This fact opens up a possible explanation of the behavior of certain Davidson and Lloyd clays when subjected to compaction for the purpose of sealing ponds. It may be that it is due to a reduced range in size of the clay particles that unsatisfactory results are sometimes obtained."

Drainage Studies - M. H. Gallatin, Homestead, Florida.-"Rainfall for the month was quite evenly distributed. There were recorded on our rain gages throughout the area seven rains of over 1 inch. Rains of over 2 inches occurred only once during the period. Rains were recorded on 20 days and distribution was fairly uniform over the period. The total rainfall as recorded at our various stations is as follows:

Location	August 1948	August 1947
Redland and Mowry	11.04	10.30
Sub-Tropical Experiment Station	10.99	11.91
Redland and Gossman	10.30	9.51
Peters, Florida	5.68	6.62
Princeton Grove	7.89	8.06
Cooper Grove	8.68	7.05
West Mowry	11.30	9.11
Highlands	8.64	5.95
Cor. Avocado and Roberts	11.74	10.55

"With the fairly heavy rains we have had gains in our water table throughout the area. For the Redland profile the greatest gain occurred about the center of the area where a gain of 1.52 foot was recorded with 0.64 foot at Highlands and 0.21 at the measuring point (the most northerly well on the Redland profile). For the Eureka profile the gains were not

as high. In the vicinity of Peters, Fla., gains of only 0.06 to 0.12 foot were recorded. To the westward on this profile the gain in water table increased to 1.19 foot. On the Mowry street profile the greatest gain was recorded at the western end with a gain of 1.22 foot. This gain was more or less constant eastward to Homestead where the gain was less. A gain of 0.87 foot was recorded at E33. The readings at Well No. 5 on August 31, 1948, was 4.66 feet m.s.l., August 31, 1947, 4.80 feet m.s.l., and August 31, 1946, 4.37 feet m.s.l. The water table at this well for the past 2 years has been about the same.

"There is little doubt that the water table of this area is affected by the water table to the west and northwest. We hope, in the near future, to try some flow studies to try to plot direction and rate of flow at different water table levels.

"Sampling for nitrate analysis on these plots shows that it has been lost by excessive rainfall during this period. Up to the beginning of the heavy rains the grass mulched area had built up to 20-25 ppm of nitrate nitrogen. The build-up of nitrates in the various types of mulching materials has been as follows: grass, pine straw, natural cover, check and shavings.

"Where higher organic types of nitrogen fertilizers are being used the losses are not as heavy as for the areas on which low analysis fertilizers are used. On those groves on which the higher organics are being used the relatively small portion available is lost, but because of the reserve when soil temperature water relations are optimum, there will be a release on nitrogen. When using low analysis fertilizers, however, where the greater portion of the N is readily available, all of this can be lost and there will be little or no reserve to supply needed plant food. On several of the cooperating groves where this low analysis type of fertilizer has been used the past several weeks, we have lost practically all of the nitrogen."

Drainage Studies - T. W. Edminster, Blacksburg, Virginia. - "At the time of Mr. Uhland's visit, it was agreed that the assistance of the Metallurgy Department should be called in in selection of materials for any improved models in the Uhland soil sampler. The Project Supervisor had several conferences with Professor H. V. White, Head of the Metallurgy Department, VPI, and through Professor White contacted a number of metallurgists in various industries with regard to the problem. It was generally agreed by all contacted that the cutting heads of the samplers could probably be made of the stainless steel 410, 420 or 440-A types followed by heat treatment. This, together with several modified features of design, should eliminate the major factors that caused failure in the original models.

"Mr. Walter L. Turner, Jr., Soil Scientist, has submitted a work improvement suggestion for the rearrangement of the headings of the second and third columns of the Permeability Data Sheets. He has suggested that in addition to showing the permeability index for the average rate of percolation of all replicates that the fiducial limits of the percolation data be also shown.

Permeability Rate			
: Index		: Index Numbers of fiducial	
Average: of :		limits	
in./hr.:Average:		l_1	l_2
9.67	6	6	7
5.46	6	4	6

Notes:

1. The averages are for five replicates.
2. The index numbers from 1 to 7 are in the order of the rate given on p. 9 of the Guide for Soil Conservation Surveys.

"This recommendation is very valuable in that it will give designing engineers, who are reviewing the data, an opportunity to judge what trends in variation might occur in the testing area. For example, if the fiducial limits show that a soil which on an average basis may have an index of 6, but actually has one limit which is an index of 4, it will caution the engineer that low permeability conditions may exist in some parts of the area and enable him to adjust his design accordingly."

Supplemental Irrigation Studies - James Turnbull, Lake Alfred, Florida. - "The hurricane of September 21-22 did little damage in this area. Maximum winds of 45 miles per hour were accompanied by heavy rains which averaged about 7 inches in this vicinity. The heavy rainfall brought water-table elevations and lake levels on the Dr. Sample estate to their highest point since records were started in 1946.

"A series of 176 soil samples were taken late in the month under the same trees where samples were taken last year at this time. It was found that 16.5 percent of the samples contained soil which was difficult to wet. This compares with 6.8 percent which were difficult to wet last year. Apparently the drought of May and June permitted some of the soil to revert back to its state of being difficult to wet.

"A quick-coupling suction connection is required for the Ft. Pierce irrigation system which must be moved frequently. A design has been developed and will be made up as soon as shop facilities are available.

"Limited tests of grapefruit quality have been made by station horticulturists on fruit from our experimental irrigation plots. These

tests indicate that the quality of the fruit, as measured by its citric acid content and percentage of soluble solids, is lower on fruit from irrigated plots than it is on fruit from unirrigated plots."

Supplemental Irrigation Studies - J. R. Carreker, Athens, Ga.-
"September weather conditions contained the paradox of near normal rainfall with 3.49 inches and a drought of 21 days at the supplemental irrigation plots. Rainfall was measured as follows:

Sept. 4 - 5.....	2.75 inches
Sept. 23.....	0.05 inches
Sept. 27 -28.....	0.69 inches
Evaporation from the free water surface was 5.00 inches.	

"The late planted corn, the permanent pastures and the vegetables were irrigated with a 1.0 inch application September 2 and 3 because of a deficiency of rainfall the latter part of August. The rainfall on the 4th and 5th probably erased any effects from this application however.

"Another irrigation of 1.0 inch was made on September 21, 22, and 23 to the late corn, supplemental pasture, and permanent pasture, respectively. The 4 to 6 days between these applications and the following rain should be enough to permit beneficial results.

"The irrigation equipment was carried to the Southern Piedmont Conservation Experiment Station 100-acre farm unit September 1, and 1/2 of the 2-acre patch of alfalfa was irrigated with 2.0 inches of water.

"A conference of the District, Zone and State Conservationists in Georgia was in progress at the Station at that time. This alfalfa irrigation was used as a demonstration for that group.

"This project was given prominent mention in an article, entitled "Rain by Telephone," in the August, 1948 issue of Country Gentleman. As a result of this article, inquiries concerning irrigation have been received from farmers in Oregon, California, Texas, and Maine."

Irrigation Studies - T. W. Edminster, Blacksburg, Virginia.-
"The 1948 irrigation work on the McPherson Farm has been briefly summarized by Mr. J. W. Propst, Jr., Assistant Agricultural Engineer under TVA Contract to the Experiment Station. This summary is given on page 20. As indicated, the net profit per acre is rather low, however, if the total rainfall that fell during the test period is noted, it is evident that profits through irrigation in such a year could not be expected to be high."

SUMMARY OF ALFALFA IRRIGATION DATA

McPherson Farm

1948

1st. Cutting - May 18, 1948

No irrigation due to ample rainfall well distributed over growing period.
Rainfall April 1 to May 18 - 6.39 inches
Yield unknown - (Crop cut by owner without notifying Experiment Station)

2nd. Cutting - June 24, 1948

One application of 1.5 inches
Rainfall May 18 to June 24 - 5.82 inches
Average alfalfa yield of irrigated area - 2300#/acre barn dry hay
" " " check area - 2300#/acre " " "
Increase due to irrigation - none

3rd. Cutting - August 8, 1948

Two applications of 1.5 inches
Rainfall June 24 to August 8 - 6.62 inches concentrated near the end of the growing period.
Average alfalfa yield of irrigated area - 2791 #/acre barn dry hay
" " " check " - 2147 #/acre " " "
Increase due to irrigation - 642#/acre or 29.9%.

4th. Cutting - September 13, 1948

Two applications of 1.5 inches
Rainfall August 8 to September 13, 1948 - 2.83 inches
Average alfalfa yield of irrigated area - 2509#/acre barn dry hay
" " " check " - 2051#/acre " " "
Increase due to irrigation - 458#/acre or 22.3%

Summary:

Total yield from irrigated area (excluding 1st cutting) 7600#/acre
" " " check " " " 6498#/acre
Increase due to irrigation 1102#/acre or 17%

Economies of System:

Cost per Acre

Power at \$1.00 per acre inch	\$ 7.50
Depreciation - at 10%	10.00
Labor - 1 man hour per acre inch at \$0.50	3.75
Total	21.25
Value of increased yield at \$50.00 per ton	27.50
Net profit	3.75 per acre

IRRIGATION DIVISION

Drainage of Irrigated Land, Imperial Valley, Calif. - George B. Bradshaw, Imperial, Calif.-"Results of tile installation and leaching on a 240-acre tract of virgin desert land northeast of Holtville, Calif. are as follows:

"The surface soils are of medium texture. In general the entire soil profile consists of alternating layers in varying thickness consisting of light to heavy textured materials overlying a heavy clay at depths varying from six to ten feet.

"The farm was tiled May 19, 1947, and 25,538 feet of tile were installed at a depth of 6.5 feet and a lateral spacing of 250 feet. The land was then leached for 129 days. The salinity changes by feet to a 5-foot depth are given in the following table.

"After tiling and leaching the virgin land was planted to barley and produced an average of 2,227 pounds of barley per acre.

"The land is still very saline and will improve rather slowly without further leachings. However, the owner expects to leach several more times, in shorter periods, during the next few years to speed up the salt removal."

Leaching studies, Immel Ranch, Imperial Valley, Calif.

Depth :		Dissolved solids in parts per million					
of :	:	:	:	Bicar-:	:	:	:
sample:	Calcium:	Magnesium:	Sodium :	bonate:	Sulfate :	Chloride :	Total
Feet	Before Leaching						
0-1	3700	890	10180	372	9336	17750	47500
1-2	1800	473	7009	305	9048	8520	28310
2-3	1560	284	4213	519	7248	4438	18710
3-4	790	234	3399	244	5040	3461	13570
4-5	360	81	1495	305	3346	2574	10440
	After Leaching						
0-1	850	218	1612	394	4752	888	8450
1-2	1190	271	3559	275	7656	2574	16440
2-3	1570	313	4662	183	7512	5236	20840
3-4	1490	517	4375	183	6552	8165	24500
4-5	900	345	5191	183	4128	7455	18980

Upper Santa Ana River - Dean C. Muckel, Pomona, Calif.-"The regular scheduled irrigation season ended in Yucaipa Valley during the month and soil sampling in a typical peach orchard was carried through the entire season. These soil moisture data have been worked up and are now in the process of being analyzed. Preliminary examination of the data indicates a very large proportion of the water extraction by the tree roots occurs in the top 3 feet of soil and most of this is in the immediate vicinity of the furrows. There was very little water extracted from the unirrigated portion of the orchard although the soil contained available moisture from winter rains. Irrigation efficiencies ranged from 54 to 86 percent, the differences apparently caused by the soil moisture content at time of irrigation. During the regular irrigation season, water is delivered to the orchard on a 14-day schedule in equal amounts and irrigations in the spring may be given when not actually needed, causing low efficiencies. The higher efficiencies occurred during the maximum water-using periods."

Soil Conservation Districts - V. S. Aronovici, Pomona, Calif.-"A series of five soil types were sampled for soil transmissibility measurement in cooperation with the staff members of the Techachapi Soil Conservation District. These samples were processed in the Pomona Laboratory. Due to the large amount of computing necessary to convert millileters discharge per given time to inches per square inch per hour, a nomogram was devised so that the recorded observations could be read directly in terms of inches. It was found that this nomogram has reduced computing time many fold, resulting in the elimination of this factor as a bottleneck in laboratory procedure. Check of the accuracy of this device revealed that the results are within five percent of slide rule results. The big advantage of this chart is to those technicians not thoroughly familiar with the slide rule and must resort to long hand or calculator."

Grand Valley Drainage Study - William W. Donnan, Los Angeles, Calif.-"One week was spent on a detail to Grand Valley, Colorado to assist with a drainage problem in the Grand Valley Soil Conservation District. This problem has been under investigation by the District for some time. Utilizing the data from this investigation plus some data from a 1916 investigation, a series of charts were drawn to indicate the probable source of the water and the logical remedial measures to be employed. The analysis indicated that pumping from relief wells tapping a gravel aquifer under considerable hydrostatic pressure would probably effect drainage of most of the high water-table area.

"In addition, it was determined that the source of the water was not the shale beds, the river nor the upper canals - three possible sources, but that it conceivably could come from over-irrigation and from the natural drainage washes. A brief report was prepared indicating the conclusions and suggesting a plan of remedial measures."

San Fernando Valley Progress Report - Harry F. Blaney, Los Angeles, Calif.-"A provisional 'Progress Report on Cooperative Investigations in San Fernando Valley, Los Angeles, California, 1947-48' was completed by W. W. Donnan and V. S. Aronovici and submitted to the City of Los Angeles and the San Fernando Valley Soil Conservation District for review. This report covers studies on ground water, drainage, and soils in the District. Analysis of precipitation and depth to ground-water records reveals that the wet and dry cycles coincide with the high and low general water-table levels in the San Fernando Valley. The effect of irrigation on the shallow water table is evident in the general rise in the water table in the 1947-48 water year."

Flow of Water in Concrete Pipes - Fred C. Scobey.-In his summary for notes on concrete pipe distribution systems for irrigation of Coachella Valley from the water supply of All-American canal, Scobey reports that the use of the Scobey formula for concrete pipe was conservative. The attainment of his coefficient of $C = 0.345$ is possible with rigid enforcement of specifications. This coefficient was used for small 12- to 24-inch pipe. The attainment of his $C = 0.370$ for larger pipes, from 24- to 72 inches, is more assured than is 0.345 for processes that can be used for the smaller sizes of pipe. The "service duty" used in computations is favorable to operation without trouble. The system is designed for 50 acres to the second-foot of capacity, with a minimum delivery of 3 second-feet. Since, in similar desert country east of Los Angeles areas, land is served on a basis of 1 second-foot for each 200 to 400 acres, the capacities appear ample.

Irrigation Practices and Consumptive Use of Water in Irrigation - Paul A. Ewing.-During the latter part of the month, Ewing and Blaney joined in a ground-up of the Pajaro Valley study. A visit was made to Sacramento in order to confer with State officials, and at the outset of the conference the Division was requested to delay a final report on irrigation practices and consumptive use until next year, confirming the pending report to a progress recital. Reason for this request is that the State has not reached a satisfactory conclusion as to the source and dependability of recharge of the ground water, determination of which is of basic importance in the general study. Accordingly Ewing and Blaney will report progress on their part of the study, will request the State to obtain some further data to fill in some weak places, and will make a final report later. The opportunity is offered to obtain some needed records on humidity and associated climatic influences. Instruments available for this recording will be set up immediately in expectation that significant data will be obtained during the extension of the program.

Study of Value of Water for Irrigation, Salinas Valley - Paul A. Ewing.-The report on this study for the U. S. Corps of Engineers has been completed. The manuscript is now being typed and will be submitted shortly.

Final figures based on costs and returns were: 1947 - \$42.32 per acre-foot; 1941 - \$3.84 per acre-foot. These are estimated beneficial values not related to actual cost of water, which was included with other costs of production.

Water Spreading - San Joaquin Valley - A. T. Mitchelson, H. K. Rouse, D. C. Muckel, and Eldred Bliss.-Operation of the buffer ponds at the Wasco spreading area was continued during September following an extensive exploration of the soils underlying these two ponds. A report is to follow on these examinations; however, preliminary examinations revealed no significant differences in the soils to account for the greater percolation rates recorded for the inner pond during the run from March 13 to June 1. The records during the first 10 days of the current run showed the inner pond to have lower rates of percolation during the first 5 days and higher rates during the following 5 days. During these five following days, the rates in the inner pond have continued to increase while those for the outer pond have been decreasing. The rates on the last day of the month, expressed in feet per day, were 4.22 for the outer pond and 5.26 for the inner pond. Examination of the substrata to 20-foot depth under the buffer ponds was completed, logs of all holes were made, and a report of the findings will be written in October.

Snow Surveys and Water Supply Forecasting - Wayne D. Griddle, Boise, Idaho.-"During the month Mr. Nelson from this office visited snow courses in western Montana and checked with cooperators on the operation of the snow survey network this coming winter. While on this work he attended a meeting at Lookout Pass (between Wallace, Idaho, and Missoula, Mont.) called by representatives of the Idaho Engineering Experiment Station. The purpose of this meeting was to determine the plan of operation for developing and testing new precipitation gages for use in snow country. Also attending this meeting were representatives of Washington Water Power Company and the U. S. Weather Bureau. Results of this study will be correlated with our snow course located on Lookout Pass. Another trip was made into the western Wyoming territory of the Snake River Basin and arrangements made for the continuation of the snow survey program in this area this coming year.

Water Requirement Investigations - Foster Creek Project, Washington.- "Some time was devoted to gathering additional information for the report being prepared jointly by the Washington State Experiment Station and various services of the Department of Agriculture on the proposed Foster Creek irrigation project. The rate of consumptive use by the crops which will probably be grown on this project have been estimated and will be utilized in the final report. Following is the estimated water requirement for the crops to be grown in the area.

Estimated Water Requirement

Proposed New Lands - Foster Creek Project, Washington

Crop	Irrigation water requirement			
	Consumptive:	Farm	Peak	
	use	Headgate ^{1/}	Rate of use on farm	
	In. Depth	In. Depth	In. per day	Acres per Cfs
Alfalfa	25.6	36.6	0.45	53
Pasture	22.2	31.7	0.39	62
Orchard (clean cultivated)	18.8	26.8	0.33	73
Orchard (with cover crop)	31.0	44.2	0.54	45
Corn	17.9	25.6	0.31	77
Small grain	13.0	18.5	0.25	96

^{1/} Assuming an irrigation efficiency of 70 percent.

Consumptive Use of Water Studies in Utah.-During the month Messrs. Davis and Criddle assisted by other members of the Division of Irrigation and Representatives of the Utah State Engineer's Office, classified all of the land in the Ferron Creek and Ashley Valley consumptive use study area of Utah. According to cover in this classification irrigated areas were broken down into alfalfa, wild hay and pasture, corn, small grains and miscellaneous crops. Native vegetation was broken down into five separate classifications, i.e., very dense, dense, medium dense, light and sparse. To each of these classifications will be applied a unit rate of consumptive use to determine the over-all consumptive use within the valley. The unit rates of consumptive use are being determined by the Utah State Agricultural Experiment Station through soil moisture depletion studies and through the operation of evapo-transpiration tanks."

Stephen J. Mech, Prosser, Washington.-"Our formal experiments required 75 plot-irrigations during the month of September. This amounted to practically continuous irrigation testing. It is expected that the season's irrigation for potatoes will be completed the first week in October."

"Though our efforts were directed at collecting the necessary field data for subsequent analysis, a number of observations are quite conspicuous at this time.

- (1) The potatoes whose available soil moisture was high (75 percent - 100 percent), are approaching maturity considerably earlier than

those where the available moisture ranged from 35 percent - 100 percent. It is suspected that this advanced maturity may be due to more fusarium wilt developed under the higher moisture.

- (2) Maintaining the soil moisture at a high level has resulted in a considerably lower rate of infiltration. The average rate of infiltration on the plots where the available soil moisture is permitted to range from 35 percent - 100 percent is much higher than is that on the plots where the range is 75 percent - 100 percent.
- (3) Another apparent difference due to soil moisture seems to be a difference in the compactness of the soil as indicated by its resistance to the penetration of the King soil tube. The large number of soil moisture samplings made with the King tube made it possible to make this comparison. The wet plots, (available soil moisture 75 percent - 100 percent) offered greater resistance to penetration by the soil tube than did the dry plots whose available soil moisture ranged from 35 percent - 100 percent. This is somewhat unusual but it seems that the 4 months of high soil moisture have compacted the soil to a far greater extent than the treatment where the soil is permitted to dry to 35 percent available soil moisture before irrigation."

Silt Studies - Dean W. Bloodgood, Austin, Texas.-"During the month a progress report for the period October 1, 1946 to September 30, 1947, and entitled 'Silt Load of Texas Streams, Part IX' was mimeographed and is available for distribution to those desiring it. The report consists of 54 pages and one map. This report is one of a series of annual progress silt reports that have been mimeographed since 1939.

"The Brazos River carries the largest amount of suspended silt load of any of the Texas streams. The average yearly amount at the Richmond Station (Central Texas) during 23 years is 24,898 acre-feet (based on 70 pounds per cubic foot), or a total amount of 580,279 acre-feet during the same period. This amount is sufficient to completely fill with silt some of the larger reservoirs in Texas. Since 1925 a total of 885,874,050 tons of suspended silt has passed the Richmond Station and into the Gulf of Mexico - a lot of erosion and soil loss from this particular watershed. During 1946-47 the suspended silt load passing the Richmond Station was 13,783 acre-feet which was far below normal. The drainage area above the silt station is 34,810 square miles (total drainage area 44,640 square miles).

"The average annual suspended silt load of the Colorado River at San Saba Station (Central Texas) amounts to 3,148 acre-feet. During a 17-year period a total of 53,697 acre-feet of silt has passed the station - most of which is deposited in Buchanan Reservoir. The drainage area

above the station is 18,800 square miles (total drainage 41,530 square miles).

"At the Victoria Station on the Guadalupe River the average annual suspended silt load for a 2-year period is 551 acre-feet from 5,676 square miles of drainage area. The total drainage area is 10,400 square miles.

"At the Edna Station on the Lavaca River (South Texas) the average annual suspended silt load for a 2-year period is 164 acre-feet from 887 square miles of drainage area. The total drainage area is 2,475 square miles.

"At the Rockland Station on the Neches River (East Texas) the average annual amount of suspended silt load during a 17-year period is 338 acre-feet. The total amount for 17 years is 5,788 acre-feet. The drainage area above the station is 3,539 square miles. The total drainage area amounts to 9,995 square miles.

"On the Nueces River at the Three Rivers Station (South Central Texas) the average annual amount of suspended silt load for a 20-year period is 527 acre-feet from 15,600 square miles of drainage area. The total drainage area is 16,954 square miles.

"At the Ruliff Station on the Sabine River (East Texas, Texas, and Louisiana boundary line) the silt load for 1 year amounts to 3,124 acre-feet (drainage area 9,440 square miles) while at the Logansport Station the average annual suspended silt load for a 13-year period is 806 acre-feet (drainage area 4,858 square miles). The total drainage area for the Sabine River is 9,868 square miles.

"At the Goliad Station on the San Antonio River (South Central Texas) the average annual silt load for a 6-year period is 550 acre-feet from 3,918 square miles of drainage area. The total drainage area is 4,256 square miles.

"At the Huffman Station on the San Jacinto River (South Texas) the average annual silt load amounts to 1,135 acre-feet from 2,791 square miles of drainage area. The total drainage area is 2,888 square miles.

"At the Romyer Station on the Trinity River (East Texas) the average annual suspended silt load for an 11-year period is 4,791 acre-feet (53,379 acre-feet for 11.1 years) from a drainage area of 17,200 square miles. The total drainage area is 17,730 square miles.

"Certain amounts of suspended silt load of Texas streams are not retained in the reservoirs but by-pass the dams by flowing over the spillways and through outlet gates, turbines, etc. At Possum Kingdom Dam (reservoir capacity 750,000 acre-feet) on the Brazos River, 5 percent of the silt load is by-passed; at Buchanan Dam (capacity 992,475 acre-feet) on the Colorado River, 2 percent is by-passed; while at Corpus Christi Dam (capacity 64,000 acre-feet) on the Nueces River, 36 percent of the silt load is by-passed.

Irrigation Studies.-The rice irrigation season in the pumping district of the Hockley, Katy, and Brookshire Areas was completed during the early part of September. The season started about April 30 and ended about September 15, or approximately a 138-day season. In the Hockley area a 2-inch rain fell on May 10 and that was the total amount for the season. In the Brookshire Area about 1/2-inch of precipitation fell. Last season of 101 days, 10 inches of precipitation fell. It was one of the driest seasons in the pumping area. Of a total of about 40,000 acres of rice land being irrigated in the area, approximately 2,000 acres of rice was burned due to insufficient water supply for irrigation. Our cooperator, Mr. Ray Wood, in the Hockley area, had 200 acres of rice to burn, which reduced the yield and quality of rice. None of the pumped irrigation water was drained from the rice lands and wasted. The drainage water of one paddie was used to irrigate another paddie.

"At the Ray Wood rice farm near Hockley where we are carrying on rice irrigation studies the pumping plant was delivering 1,845 gpm on May 12. From that time on of continuous pumping the discharge had dropped 1,104 gpm on September 3. The pumping plant at the J. D. Wood rice farm (another cooperator) near Brookshire did not fluctuate much during the season and discharged about 1,700 gpm.

"The average yield at the Ray Wood and J. D. Wood farms will be about 16 to 18 barrels (162 pounds per barrel) per acre. At the Richard Wood farm near Brookshire (our former cooperator) is a large field of rice that will have an average yield of about 25 barrels per acre. This soil is sandy black loam (lighter than most rice soils) and is shallow (about 4 inches deep). It overlies a whitish clay marl soil. The soil of the other Wood farms is a heavy black sandy loam or clay - very sticky and greasy. The price of the best earlier rice is \$7.00 a barrel but the later rice which is being harvested will bring a higher price. Last year the price was \$12.00 to \$14.00 a barrel. A considerable portion of the lower grades of rice goes to the breweries for making beer."

Ivan D. Wood, Denver, Colorado.-"At the request of the Regional Conservator of Region III a trip was made to Minneapolis and St. Paul to assist personnel from Region III in the examination of and the preparation of a report on irrigation possibilities for an area directly north of the Twin Cities.

"A meeting was held in the office of Herbert A. Flueck, State Conservationist in St. Paul. It was attended by Roy E. Bennett, Assistant State Conservationist; Keith H. Beauchamp, Regional Engineering Division, Milwaukee; G. V. Bowers, Economist, Regional Water Conservation Division, Milwaukee; Evan Allred, Irrigation Engineer, University of Minnesota. Other personnel contacted were C. K. Moulton of the Moulton Irrigation Company; Dalton G. Miller, Public Roads Administration, Federal Works Agency; and District Conservationist M. A. Bolline. An intensive 2-day investigation was made of a 5-county area directly north of Minneapolis and St. Paul in company with Messrs. Bowers, Allred, and Beauchamp, mentioned above. The particular region in question has light, sandy soil interspersed with areas of swamp and peat lands. Capability class is mostly III, IV, and VI. The soil is of low fertility and low water-holding capacity. A report was prepared indicating practicability of sprinkler irrigation on high yielding specialty crops but not for ordinary grains.

"Assisted with the special demonstration 'Fitting a Farm for the Future' on the John Race farm near Littleton, Colo. This event was attended by approximately 20,000 people. The committee of which I was chairman had charge of land preparation, water application, and fertilizing of a 16-acre tract which was completely leveled, disked, and fertilized in 1 day. In the leveling process about 6,500 yards of dirt were moved at a cost of \$60 to \$65 per acre; 400 lbs. of treble super-phosphate were applied per acre and about 10 tons of barnyard manure. All types of machines were used in the leveling process."

Snow Surveys and Irrigation Water Supply Forecasts.-Carl Rohwer, Fort Collins, Colo.-"Homer J. Stockwell established 12 new snow courses on the Bighorn River Drainage in Wyoming at locations suggested by the U. S. Bureau of Reclamation for Boysen Dam operation. Field trips were made for snow course maintenance in Central Colorado and on the Medicine Bow National Forest in Wyoming. Three new courses were established in this area on the Laramie and North Platte drainage. Although plans for dropping most February 1st snow readings on the Colorado River have been under consideration for some time, the Bureau of Reclamation at Boulder City has requested that these readings be taken on as many courses as possible. Mr. Stockwell has also been assembling data on our water supply forecasts for an article to be prepared by Messrs. Ewing and Work for 'Reclamation Era'.

Well Screen Performance Tests.-"Tests on the hydraulic properties of 6 Johnson Well Screens with slot openings from 0.01-inch to 0.20-inch were completed by Carl Rohwer with the assistance of Gilbert Corey and Donald Matejka. These screens were tested for discharges from 0.125 to 2.00 cubic feet per second. For these discharges the losses through the screens were small, the maximum being 0.10-foot for the screen with smallest openings when discharging 2.00 cubic feet per second. New stilling wells are being installed to make the gages more quickly responsive to changes in the water levels."

